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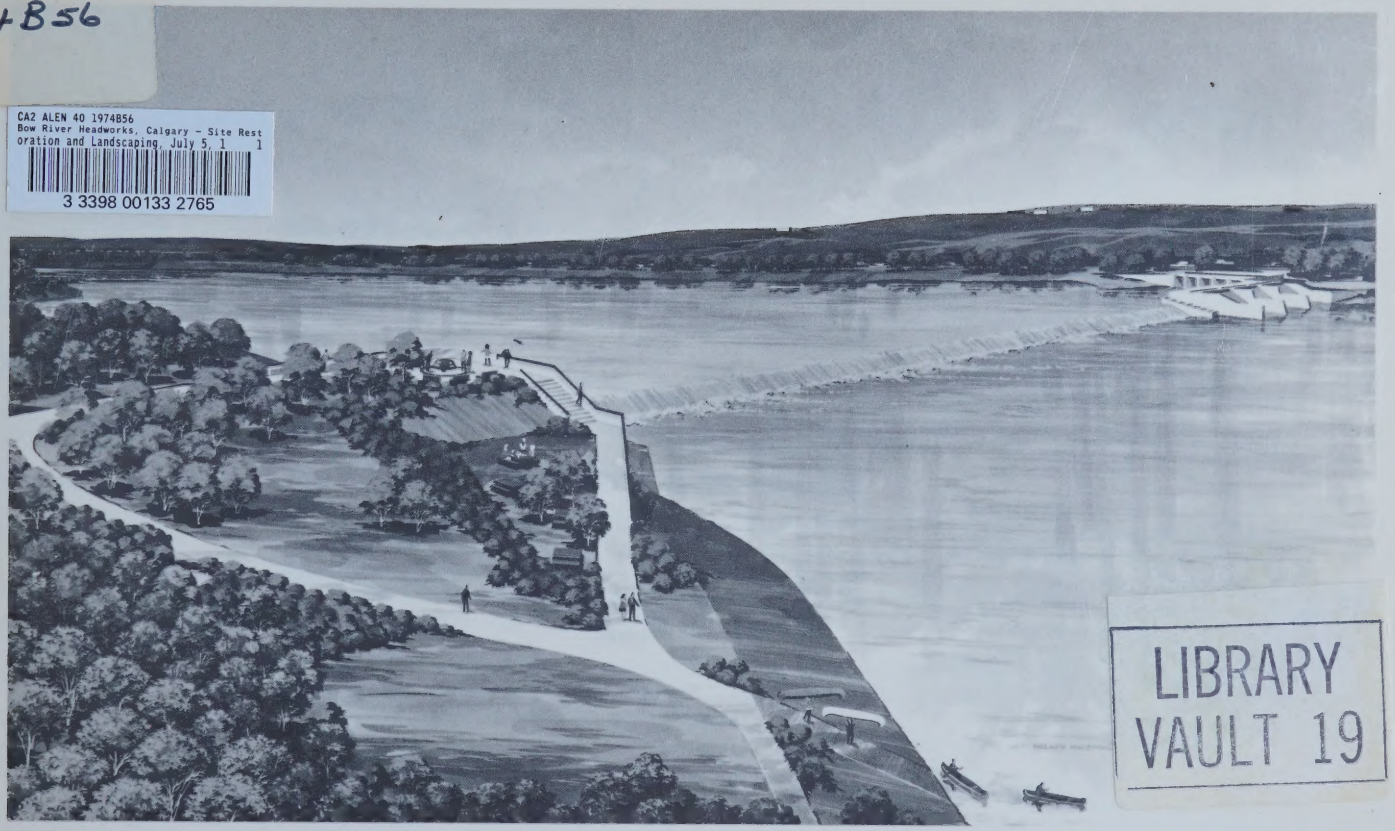

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BOW RIVER HEADWORKS calgary

site restoration and landscaping

study prepared by

Lombard North Group Limited

Landscape Architects and Environmental Planners

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Lombard North Group

The Lombard North Group Limited is Environmental planning and resource development consultants.

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Calgary, Alberta. T2T 0B6
(403) 244-8901

July 5, 1974.

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Alberta Environment,
Environmental Planning & Research
Services Division,
10040 - 104 Street,
EDMONTON, Alberta.

Attention: Mr. Carl Primus, Head,
Environmental Demand & Problem Analysis Branch.

Dear Mr. Primus:

We are pleased to submit this report summarizing the team effort involved in producing the site design and environmental guidelines for the W.I.D. headworks site. Close co-operation between all levels of government including Federal, Provincial, and the City of Calgary; and input from the Inglewood Community have resulted in a solution that will have a "positive impact" and be an asset to the emerging Calgary river park system.

We feel that comprehensive environmental planning undertaken in concert with project engineering has proven to be the most efficient and environmentally acceptable approach for future projects of this significance.

Sincerely,

THE LOMBARD NORTH GROUP LTD.

James Taylor.

James R. Taylor,
Vice President & General Manager.

JRT:nb
Encls.

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approach

The project represents a new approach to modification of the environment. The traditional route has been to produce a project designed with the criteria of engineering and economics, the environmental impact of which would later have to be mitigated. In the case of the Bow River Headworks, Calgary, however, the Province of Alberta has chosen to consider social, visual and ecological impact while there was still an opportunity to alter it during the preparation of the project.

A critical aspect of this approach has been the maintenance of effective communications between the different participants throughout the duration of the project and the involvement of the concerned community and special interest groups.

project description

The project basically involved the construction of new Bow River Headworks for the Western Irrigation District in Calgary followed by a removal of the old weir and associated rubble. Included are the following permanent elements to be constructed (see Figure 1).

1. A new weir.
2. A new Sluiceway.
3. New canal headgates.
4. Conduit sections running under the new Deerfoot Trail Freeway being constructed concurrently.
5. New abutments on the north and south.
6. A fish ladder.
7. An emergency access route.

Also to be constructed during the project but removed upon completion are the following (Figure 2).

1. A series of three earthen coffer dams.
2. A temporary gravel pad for work area for the contractor.

approach

The project represents a new approach to mobility-
tion of the environment. The traditional route
has been to produce a project designed with the
criteria of engineering and economics, the environ-
mental impact of which would later have to be
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of the project and the involvement of the concerned
community and special interest groups.

CANAL HEADGATES
SLUICEWAY
DEERFOOT TRAIL
FISH LADDER
CONCRETE RUBBLE TO BE REMOVED
BOW RIVER
ACCESS ROAD
North
RIVER CHANNEL WIDENING
PEARCE ESTATE
PEARCE ESTATE
FISH HATCHERY

figure 1

NEW DEERFOOT TRAIL
ACCESS ROAD
TEMPORARY PAD
BOW RIVER
PEARCE ESTATE
FISH HATCHERY
CONTRACTOR'S PLANT AREA
NORTH

figure 2

participants

The history of the development of the project may be best understood from the contacts established by the Province and their consultants, the Lombard North Group with the other participants in the project.

THE PROVINCE

The Province's role has been a key one as it is both the ultimate owner of the Headworks, which will be turned over to it by P.F.R.A. upon completion, and the final authority in matters pertaining to land fill, planting, and other modifications of the river channel and banks. Alberta Environment has, therefore, acted as the overall co-ordinating body through its representatives on the Headworks Implementation Board as well as through the project co-ordinator and the head of the Calgary office.

P.F.R.A.

P.F.R.A. engineers were responsible for the structural and hydrological design of the Headworks. They consequently were also responsible for ascertaining the feasibility of design recommendations which the Lombard North Group put forward to enhance the project's appearance and recreational utility and to minimize its environmental disturbance.

Contacts with P.F.R.A. took place through meetings of the Implementation Board involving the Province, the City, and the Consultants, and through a continuing working relationship with the Lombard North Group. This latter relationship began in January of 1974 and involved both the central office of P.F.R.A. and their representatives in Calgary.

THE CITY OF CALGARY

The involvement of the City of Calgary on the north bank was primarily with the Land Department which arranged land transfers for the Headworks Project and the Deerfoot Trail Freeway. On the south bank, it was the Department of Parks and Recreation which was involved to co-ordinate the project with the Pearce Estate Park upgrading.

Contacts between the Province and the City were primarily of three types. The first were negotiations conducted by the Implementation Board and involving issues of land transfers and purchases, as well as environmental rehabilitation on the north bank of the river where the Headworks project was being co-ordinated with the Deerfoot Trail Freeway. The second type of contact occurred with a meeting held in May of 1974 between the Calgary representative of Alberta Environment, the Calgary Department of Parks and Recreation, and the Lombard North Group involving the design, maintenance and recreational use of the south abutment area. Finally, in addition to the above contacts, more frequent discussions occurred between the Parks and Recreation Department and the Lombard North Group regarding the details of the project. This included such items as grass seed mixtures, path surfacing specifications, and the like.

THE LOMBARD NORTH GROUP LTD.

The Lombard North Group was retained by the Province to perform the following:

1. Recommend design changes to be incorporated into the headworks themselves.

2. Recommend environmental controls to be applied during the construction process.

3. Prepare landscaping and site restoration plans to be implemented upon the completion of the engineering works.

Also essential to the success of the project was the role the Lombard North Group assumed in facilitating communications between the various participants on a day to day basis.

COMMUNITY INVOLVEMENT

The Inglewood Community has been vitally interested in the project from the time it first became public due to their interest in the Pearce Estate as a community resource.

At a series of meetings involving the Province, P.F.R.A., and the Lombard North Group, the Inglewood Community voiced its concerns regarding tree clearing, filling and diversion of the river channel and preservation of park space. They also requested a temporary construction overlook. These items were later incorporated as requirements in the license granted P.F.R.A. by the Province for the project and integrated into the conceptual plan.

INTEREST GROUP INVOLVEMENT

The involvement of the Calgary Field Naturalists stems from their interest in the Pearce Estate as a natural area. It was included in their 1973 report, Five "Natural Areas" in the City of Calgary (C. D. Bird, Chairman and Editor). In May of 1974, the Lombard North Group consulted with the chairman of their Natural Areas Sub Committee to obtain their opinion on the appropriateness of restoration and landscaping measures proposed. The chairman of the sub committee felt that the landscaping plans would be condusive to the maintenance of the natural character of the remaining natural area of the site.

sequence of events

July, 1973 - P.F.R.A. and the Lombard North Group (representing the Bow River Study Committee) present preliminary headworks design to the Committee on Redevelopment of the Inglewood Community and gather initial comments.

September, 1973 - The Lombard North Group publishes preliminary paper on the potential environmental impact of the headworks project for the Bow River Study Committee.

October, 1973 - Inglewood accepts headworks project in principle at public hearings held by the Bow River Study Committee on Montreal Engineering Flood Study.

November, 1973 - The Province retains the Lombard North Group to perform detailed landscape assessment of the W.I.D. headworks site and develop a master site development plan.

December, 1973 - Interim Provincial license issued by Alberta to P.F.R.A. for the project.

January, 1974 - Bow River Study Committee publishes their recommendations re headworks project as well as flood control and flood plain management.

Work begins on north bank.

Initial discussions between the Lombard North Group and Calgary Parks and Recreation regarding co-ordination of the site landscape design with that of the Pearce Estate.

February, 1974 - P.F.R.A. revises the weir design, intruding less into a large stand of trees on the south bank.

March, 1974 - The Province, P.F.R.A., and the Lombard North Group meet with the Inglewood Community Association to discuss the appearance, function and environmental impact of the headworks design.

The Lombard North Group presents its preliminary landscape design to the W.I.D. Headworks Implementation Board which accepts it in principle.

April, 1974 - Artist conception of headworks and landscaping prepared.

The Province announces a program to develop the W.I.D. canal beginning with the Bow River Headworks for recreation.

Contract awarded for work on south bank.

May, 1974 - More detailed landscaping plans presented by the Lombard North Group to Calgary Parks and Recreation. Discussions between the above and the Province re maintenance of the site.

Discussions and correspondence between the Lombard North Group, Calgary Parks and Recreation and Alberta Horticultural Branch re natural materials for landscaping.

Calgary Field Naturalists consulted by the Lombard North Group regarding the appropriateness of landscaping proposed for the site and the effectiveness of environmental protection measures recommended.

Construction begins on south abutment.

P.F.R.A. presents plans for removal of the old south abutment.

June, 1974 - P.F.R.A. revise plans for removal of old south abutment in response to recommendations by the Lombard North Group regarding environmental impact.

The Lombard North Group submits its final landscape plans and report.

Construction complete on north bank.

January - March, 1975 - Removal of old weir.

May, 1975 - Completion of all construction, including cleanup.

May - June, 1975 - Landscaping of south bank.

the site

GENERAL REMARKS

The key factors essential to an understanding of the environment of the site are as follows:

1. Portions of the site are valuable wildlife habitat. This habitat is scarce within the City of Calgary.

2. Much of the area, especially on the north bank had already been cleared for the site of the new Deerfoot Trail Expressway and for a City snow dumping site.

3. Most of the area is presently either parkland or open space, or will be devoted to these uses in the near future.

4. The river and riverbanks have great recreational potential although this has not been fully utilized yet.

5. All of the site is currently subject to flooding, some of it to annual flooding.

DETAILED SITE DESCRIPTION

In order to accurately evaluate the environmental impact of the project, the site must be understood in terms of its historical development as well as present make-up and use.

Prehistory and History

The origins of the site, the sharp bend of the Bow River, trace back to the last glacial period when the ice sheet acted as a barrior to deflect the river southward for fifteen miles before continuing eastward. The river has left deep gravel beds containing many fossils.

Although the location called "the Elbow" was known for centuries by the Indians, it achieved its fame as the Pearce Estate when it became the site of the mansion constructed by William Pearce, civil engineer, researcher, statistician, mining advisor, and proponent of irrigation, in 1889. Although the estate remains, the mansion has since been torn down.

The involvement of the Western Irrigation District in the site dates back some sixty years to the construction of the original headworks and canal.

Present Condition

The natural quality of most of the area has been compromised or destroyed over the past few years. For a healthy natural environment capable of supporting wildlife what is required is diversity - diversity in types of vegetation and in types of cover (trees, shrubs, grasses, etc.). Clearing for construction sites, paving for roadways and parking lots, and building of structures have completely eliminated wildlife habitat. Clearing undergrowth and the filling in of wetlands to replace them with simple turf and the trees in

park sites, has drastically simplified the natural environment and reduced its capability to support wildlife.

The only portion of the project site area with any significant diversity and attractiveness to wildlife is the area within close proximity to the south bank of the river. Some of this is to be affected by the headworks project. The area includes the following (see Figure 3).

1. A willow thicket on a mud covered bar upstream from the old weir and the site of the new one: frequent flooding prevents other vegetation from becoming established here except for rushes and cattails. The willows have served as a nesting site for birds in the area. The banks here are relatively stable with a gradual accumulation of fine sediment which is reducing the flow of the river.*

2. A man-made dyke covered by a dense, even-aged stand of large Balsam Poplars: Red-Osier Dogwood, Water Birch, Willow, and a few herbaceous plants are found in the understory and on the woodland floor. This dyke continues up river beyond the headworks site and the Pearce Estate boundary. It is not, however, sufficiently high to protect the Pearce Estate from being inundated during the most severe floods of the Bow River.

3. "A marsh or backwater area under water much of the time: Horsetails, Cattails, and Rushes flourish in this damp environment".*

4. A gravel bar covered annually by spring floods: a few willows and herbaceous plants grow here in late summer and fall.

5. A point gravel bar that becomes an island at high water: the more severe floods can sweep over the island, but Balsam Poplar, Willow and River Birch have become established on the gravel. "Gulls, Red-winged Blackbirds, and Magpies have been observed on the island."*

6. A heretofore relatively undisturbed riverbank: here is found a community of mature Balsam Poplars, Red Osier Dogwood, Water Birch, Wild Licorice, and Choke Cherry comprising the understory. Red winged Blackbirds and Magpies frequent the area.

7. The Pearce Estate Park site: most vegetation except for the mature Balsam Poplars and a few Red Osier Dogwood has been cleared and non-native grasses introduced.

8. The Provincial Sam Livingston Fish Hatchery: the building is set up on a raised earth platform. Fish habitat tanks, parking lots and driveways produce a man-made atmosphere on the site.

9. A riverbank site formerly barren, then landscaped, and then cleared again to allow contractor's plant area for the south abutment portion of the headworks.

10. A developed industrial site.

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* Bird, C. D., Chairman and Editor. Five "Natural Areas" in the City of Calgary: A Report Prepared by a Committee of the Calgary Field Naturalists Society. January 6, 1973.

north
BOW RIVER
NEW DEERFOOT TRAIL
PEARCE ESTATE
FISH HATCHERY
1
2
3
4
5
6
7
8
9
10

figure 3

Uses of the Site

The site is currently subjected to the following uses, or will be in the near future.

1. Irrigation: Long standing use by the Western Irrigation District as headworks for their canal.

2. Recreation: Great potential for the river and adjacent banks only recently coming to be fully realized including canoeing, rafting, picnicing, hiking, bicycling and nature observation.

3. Transportation: The Deerfoot Trail Freeway along the north bank of the river structurally integrated with the canal headgates.

environmental impact

OVERVIEW

Although the area in which the new Bow River Headworks are to be located was at one time an excellent natural area in the city, recent projects and policies have significantly reduced its value in terms of aesthetics and wildlife habitat. In spite of this, the portion of the Headworks site on the south bank is the last of the fairly natural environment in the area and one of the few such remaining in the city. The environmental impact of the project should thus be determined and the implementation conducted in a careful manner so as to not destroy the natural and recreational values.

The aspects of the project which must be considered for their impact upon the site are as follows:

1. Vegetation clearing.
2. Cut and fill of the riverbank.
3. Construction access and plant space.
4. Permanent access route.
5. Removal of the old headworks and associated rubble.
6. Dust during construction.
7. Siltation during construction.

DETAILED ANALYSIS, RECOMMENDATIONS AND ACTION

The relevant aspects of the project are considered below in terms of their environmental impact, recommended measures to mitigate this impact, and action taken to date to follow these recommendations.

Vegetation Clearing

Vegetation must be cleared in areas where the land must be regraded and/or access and working space provided during construction. This will have a very high impact since natural areas complete with understory vegetation such as is found on the south abutment site is fairly rare within the city and is of significant value for wildlife habitat. The mature trees on the site also contribute significantly to the area's attractive natural image.

1. RECOMMENDATION: As much of the site's vegetation should be preserved as is possible while allowing construction of the project. This should be accomplished by limiting the area to be cleared as shown in Drawing #1. Furthermore, there should be a temporary snow fence, or some similar device to delineate the area available to the contractor. It should be made clear that all trees and shrubs outside the delineated area are to be preserved.

   ACTION: P.F.R.A. has already substantially reduced the "area to be cleared" for the project and has given verbal assurances that it should be possible to restrict clearing to the river side of the dyke on the south bank. A snow fence has also been erected.

2. RECOMMENDATION: In addition, there should be an effort made to preserve some trees, or groupings of trees within the construction area, especially along the edge to soften the change of appearance between the areas cleared and not cleared. These trees should be also protected by snow fencing, or something similar, and their immediate surroundings should be avoided by heavy equipment to prevent undue compaction of the soil.

   ACTION: Trees to be saved have been tagged by P.F.R.A. and checked by the Lombard North Group.

3. RECOMMENDATION: Landscaping following the project should include replanting to approximate as closely as possible the natural image of the riverbank through the use of native trees, shrubs and grasses or substitutes which closely resemble them. These materials should, furthermore, be planted in dense irregular groupings resembling the natural ones.

   ACTION: The Province has accepted the responsibility of landscaping the site, and plans have been drawn up reflecting the above stated principles.

Cut and Fill of the Riverbank

The principal impact of this action comes from the vegetation removal necessitated by it. Apart from the vegetation that must be removed directly, there is also a problem posed by disruptions of the normal flow of water, air, and nutrients to the plants' roots. In addition, fill along the riverbank, especially around the island, would destroy a low lying wetland that is an important part of the natural ecology of the site. Also involved is the visual impact of the grading. Even, rectilinear grading tends to look mechanical and detracts from the natural image of the riverbank.

A special consideration involves the role of the old south abutment in the protection of the island from erosion. P.F.R.A. plans to streamline the grading following the removal of this abutment which could increase the flow of flood waters over this island, as well as reduce the visual interest of the site.

1. RECOMMENDATION: Alteration of the grading of the site should be the minimum necessary to ensure the safety of the headworks in flood situations. This requires only the elevation of the south abutment above the design flood level and the establishment of such slopes as are necessary to prevent erosion.

   ACTION: As mentioned, the area of cut and fill has been reduced by P.F.R.A. from what was originally proposed with a shortening of the weir to be constructed. Discussions with the Lombard North Group also resulted in the abandonment by P.F.R.A. of a plan to substantially alter the grades in the area where the old south abutment is to be removed. This resulted in the saving of a number of large poplars important because of their location and the retention of some protection from erosion for the island.

2. RECOMMENDATION: There should be no more filling of low lying riverbanks wetlands than is absolutely necessary for the project, especially in the area near the island.

ACTION: General Provincial policy prohibits fill in the river's floodway. Although a temporary gravel pad to enlarge the contractor's working area will be constructed here, it will be removed upon completion of the project.

3. RECOMMENDATION: In the area on the Pearce Estate side of the south abutment which must be cleared for construction access, the slope of the new grades should be more gradual to provide easier access to the public and a more useable area in terms of recreation.

   ACTION: The steepness of this slope has been modified by P.F.R.A. from a constant 3:1 to include areas of 20:1 and 10:1.

4. RECOMMENDATION: Contours of the new grades on the site should be smooth flowing and natural appearing.

   ACTION: The softening of these contours as shown in Drawing #4 has been accepted by P.F.R.A.

Construction Access and Plant Space

Area required for the contractor's access road, working space and construction plant increases the area that must be disturbed for the project affecting both the recreational and natural aspects of the site.

1. RECOMMENDATION: The length of the access road and the area of plant and work space to intrude upon Pearce Estate should be minimized.

   ACTION: As a result of discussions between P.F.R.A., the City, the Province, and the Lombard North Group, the length of access road within the Pearce Estate was reduced by one half, and the work space around the south abutment site was also significantly reduced. Space lost was more than made up for by a temporary gravel pad in the river channel below the old weir and by occupation of a vacant site downstream from Pearce Estate. This latter site, however, contained some recent minor landscaping that will have to be replaced.

2. RECOMMENDATION: The use of the access road should be controlled to prevent the entrance of unauthorized vehicles into the pedestrian environment of Pearce Estate, especially at night, in response to the City's concern.

   ACTION: Use of the road is being controlled at the construction plant during the day, and the road has provided a gate that is locked at night.

Permanent Access Road

There will be a permanent access road remaining after construction to provide emergency access to the site. This road could be a galring artificial barrier between the Pearce Estate and the natural riverbank.

1. RECOMMENDATION: There should be a reclamation of the access area to include the covering of the gravel pad with topsoil and then the planting with grass and shrubs out. The hardness of the edge of the road should be visually softened by the addition

of extra fill to alter its straightness. A portion of the road, eight feet wide, should be covered with shale to provide an attractive pedestrian pathway as well as an intermittent service access route for light vehicles. Heavier vehicles would rarely be required but could be allowed to come in over the planting when necessary. No tree planting, however, should obstruct this route.

ACTION: Landscaping plans prepared for the Province have incorporated these recommendations including landscape rehabilitation of the access road and the Russel Steel environs. Furthermore, Calgary Parks and Recreation is so enthusiastic about the planting of this route that they have offered to replace any shrubs that would be destroyed during emergency access operations.

Dust Control

Dust generated on the construction site can be a problem both for the recreationalists in the adjacent park and for the vegetation surrounding the site.

1. RECOMMENDATION: Dust control should be exercised by the contractor on the site.

   ACTION: P.F.R.A. has agreed to undertake to make the contractor control dust during construction.

Siltation

Increased siltation of the river will also be a problem for aquatic life. The short term losses will eventually be recouped, however. No reasonable alternative is available as the most disruptive construction, placement and removal of coffer dams, must be carried out during the seasons when the river is not frozen, including the time when the fish are breeding which is early spring.

1. RECOMMENDATION: An effort should be made to limit activities producing excessive siltation to periods later than early spring.

   ACTION: This may be possible in the case of the spring of 1975.

SUMMARY OF IMPACT

The "before" and "after" views of the site are summarized in Figures 4, 5, and 6.

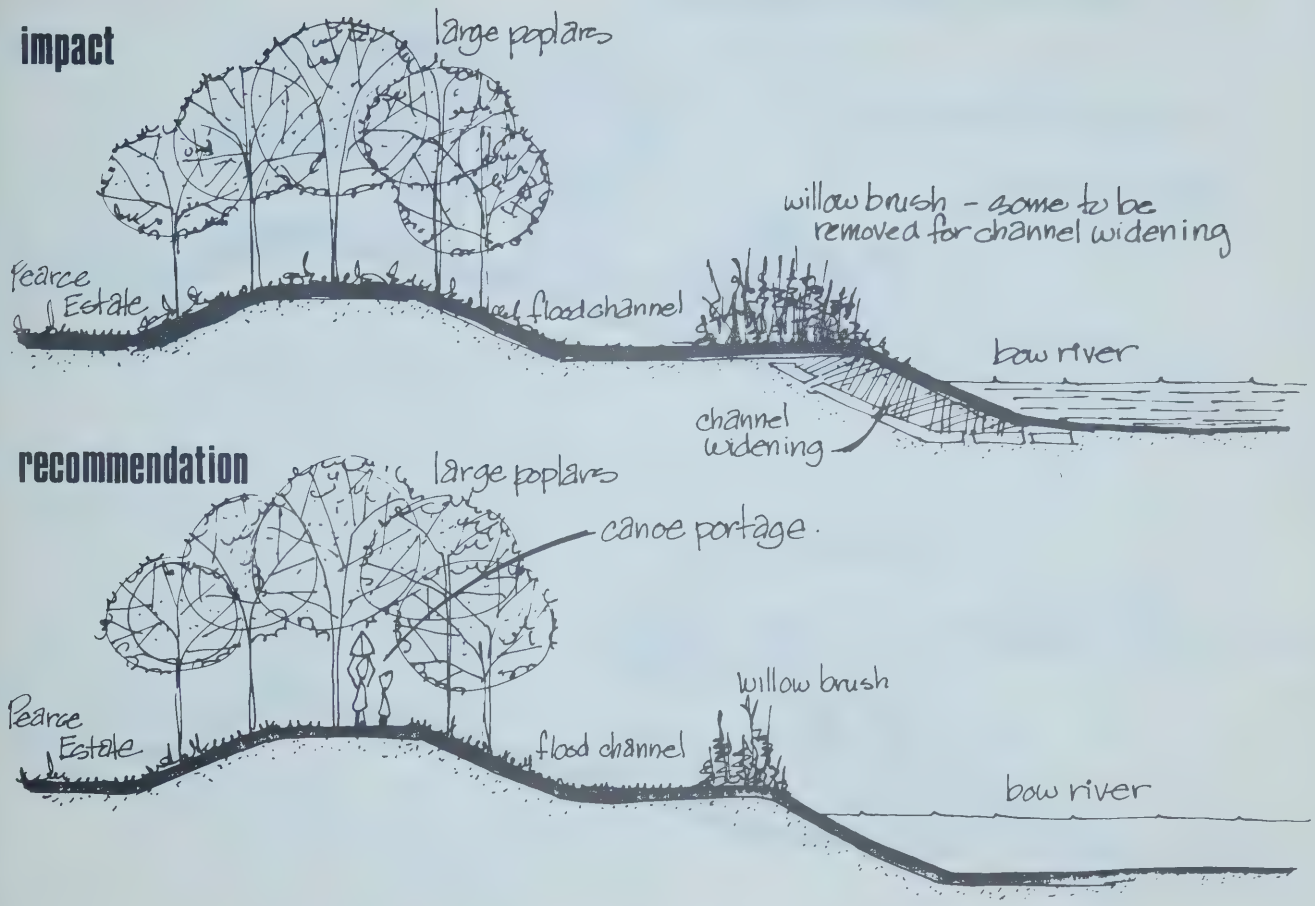

impact
large poplars
willow brush - some to be removed for channel widening
Pearce Estate
flood channel
bow river
channel widening
recommendation
large poplars
canoe portage.
willow brush
Pearce Estate
flood channel
bow river

figure 4

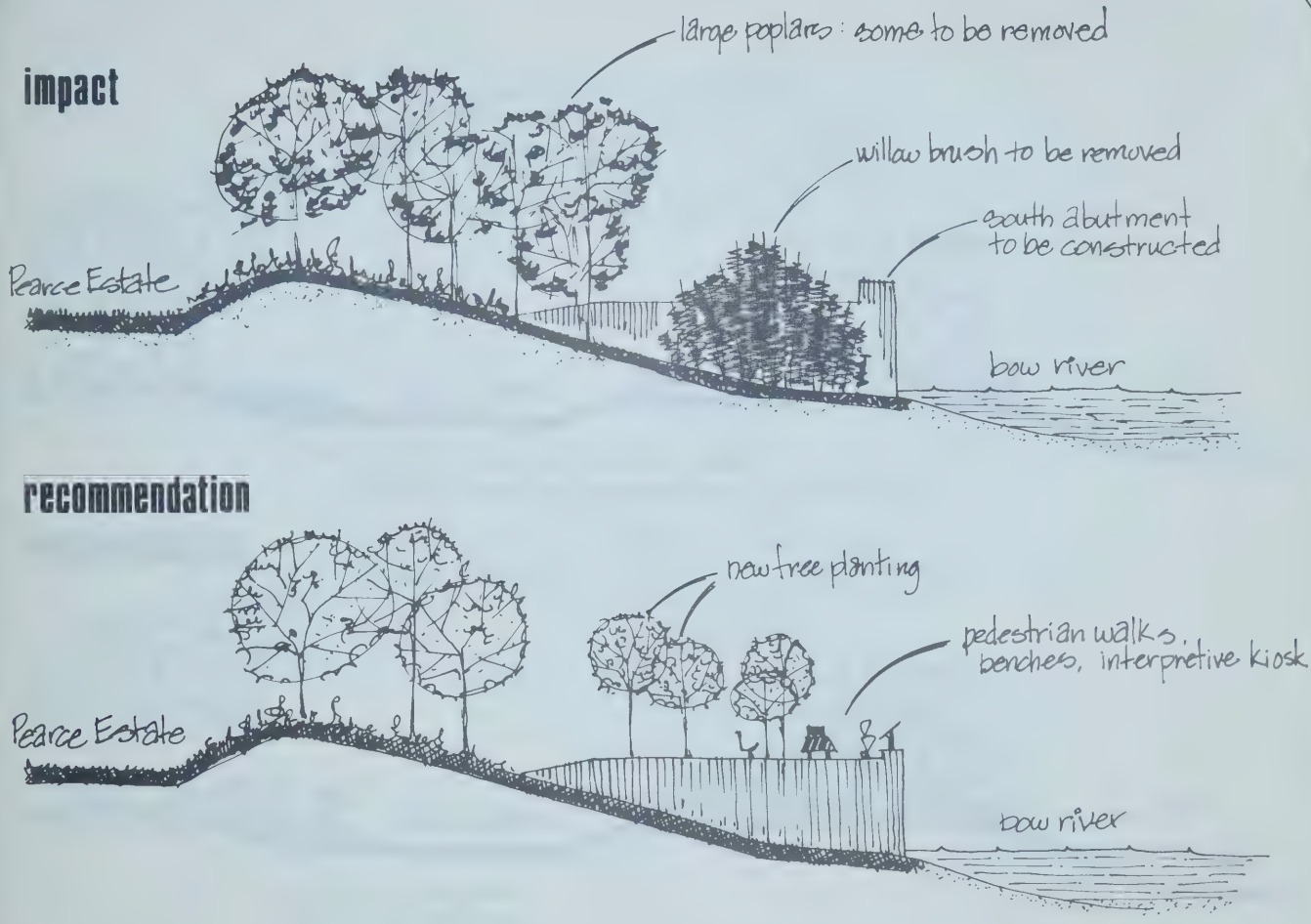

impact
large poplars : some to be removed
willow brush to be removed
south abutment to be constructed
Pearce Estate
bow river
recommendation
new tree planting
pedestrian walks, benches, interpretive kiosk
Pearce Estate
bow river

figure 5

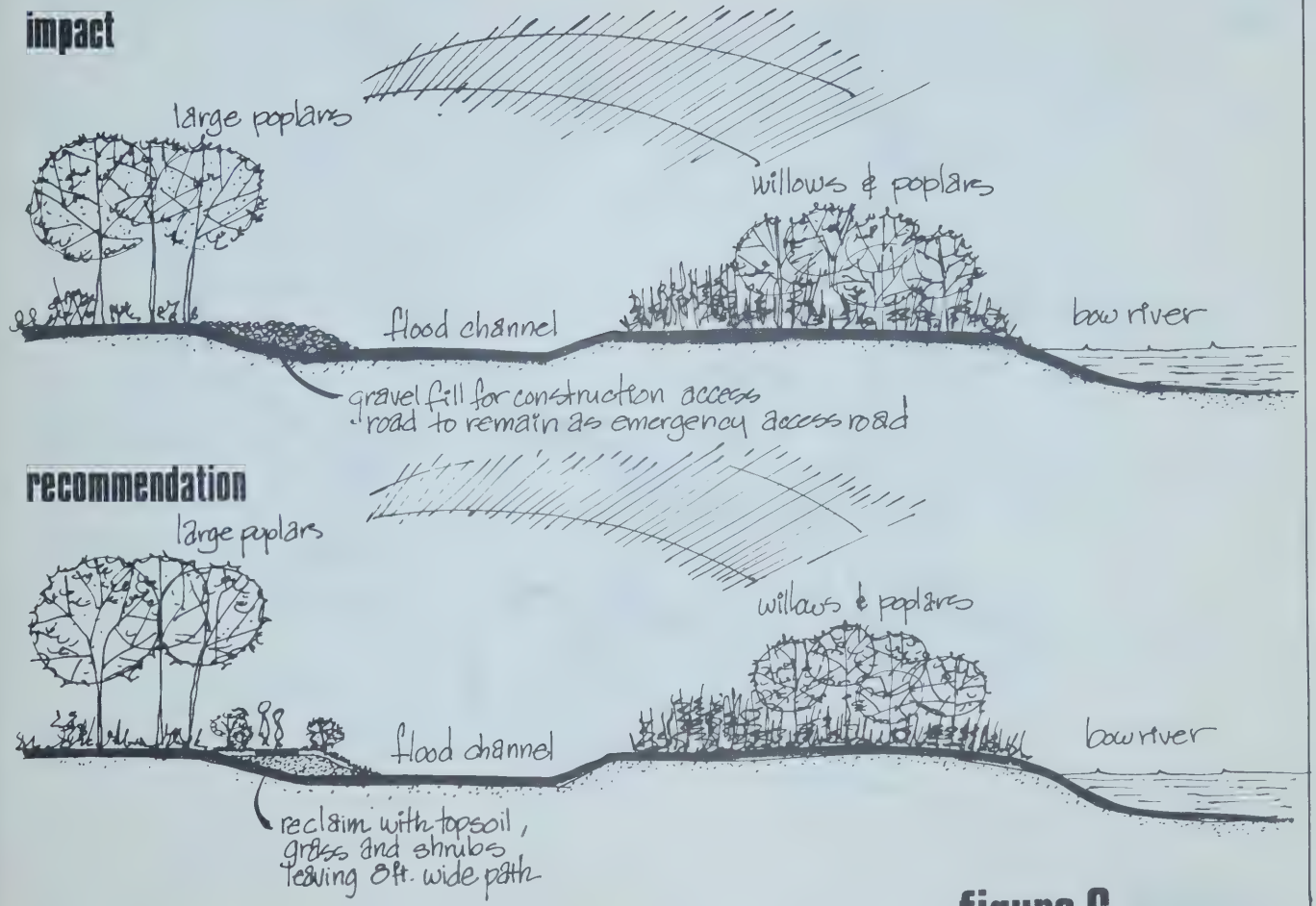

impact
large poplars
willows & poplars
flood channel
bow river
gravel fill for construction access road to remain as emergency access road
recommendation
large poplars
willows & poplars
flood channel
bow river
reclaim with topsoil, grass and shrubs leaving 8ft. wide path

figure 6

north
BOW RIVER
NEW DEERFOOT TRAIL
FIGURE 6
FIGURE 5
FIGURE 4
PEARCE ESTATE
FISH HATCHERY

figure 7

site enhancement

CONCEPT

The recommended landscape design utilizes the variety of spaces, slopes and vegetative cover conditions generated by the hydrological and engineering considerations, which have a bearing upon the site, to create an interesting, attractive, and functional area.

Two different themes are present:

1. The monumental, man-made image of the headworks.
2. The natural character of the river and the surrounding area.

The portion of the site immediately adjacent to the headworks should follow the former while the rest of the site should be restored to blend as much as possible with the latter.

LANDSCAPE ELEMENTS

Aesthetic recreational and educational amenities will include the following:

Tree and Shrub Planting

Native or closely-related materials will be used throughout to reconstruct the natural image and to assume hardiness and low maintenance (Drawing #5).

1. In the immediate vicinity of the south abutment, large trees and shrubs will be planted in dense groupings for immediate effect in areas of greatest public exposure.
2. Along the access road, trees will not be used because of the emergency access requirements and the prohibition on tree planting in the floodway. Shrubs will be planted.
3. In the contractor's plant area near Russel Steel, the planting of ten Northwest Poplar will be required to replace those lost or damaged during construction.

Turf

This is the most suitable ground cover because of its tolerance to active recreational use and its appropriateness to a prairie setting. Grass seed mixtures will include species which are drought, inundation and wear tolerant and which do not grow very high to keep maintenance to a minimum. To preserve a natural image, the excessive use of exotics like Kentucky Bluegrass should be avoided. However, wholely native seed mixtures, besides being difficult to obtain would also fail to blend gracefully with the now manicured Pearce Estate. (See Specifications.)

Pedestrian Pathways

These will be required to permit full public use and enjoyment of the headworks. Pathways on the north bank will be incorporated into the development of the Deerfoot Trail Freeway. On the south abutment, the following will be required:

1. The pathways should, first of all, be structured in an hierarchy, a system (Drawing #1). There will be a through-path for people by-passing the site on the currently developing Bow River trail system. There will also be a portage route for canoeists by-passing the weir. Finally, there will be an interpretive/scenic turnoff leading out to the end of the abutment and following along the

edge of the flowing water at the abutment wall. The latter portion would require a stairway integrated with the structure.

2. The recommended material for most of the pathways would be red shale to co-ordinate with planned upgrading of Pearce Estate pathways (Drawing #7). The portion near the abutment, however, would be most appropriately concrete (Drawing #6).

Interpretive Kiosk

There will be a permanent interpretive kiosk on the south abutment to relate the history of the Western Irrigation District and the function of the headworks and the fish ladder. This will be a sturdy, attractive, low maintenance structure (Figure 5, Drawing #7).

Seating

Some benches will be placed at the interpretive overlook site. Again, these should be sturdy and low maintenance.

Canoe Landings

Two canoe landing sites will be located upstream from the Headworks, the first one just downstream from the railroad bridge at the west end of Pearce Estate, the second just upstream from the weir. The former will be the "official" one. The latter will be a "last resort" and by use of shrub plantings would be made inconvenient to use. There has been much discussion with P.F.R.A. and the City as to the distance acceptable for a portage and the limit of safe approach to the weir's entry velocity. However, the area between the two recommended canoe landings is unacceptable because it is inundated and impassible at normal high water and because it contains a dense stand of willows. In addition, warning signs will be placed at the canoe landings and upstream to advise canoeists of the hazard of the weir and the availability of the portage.

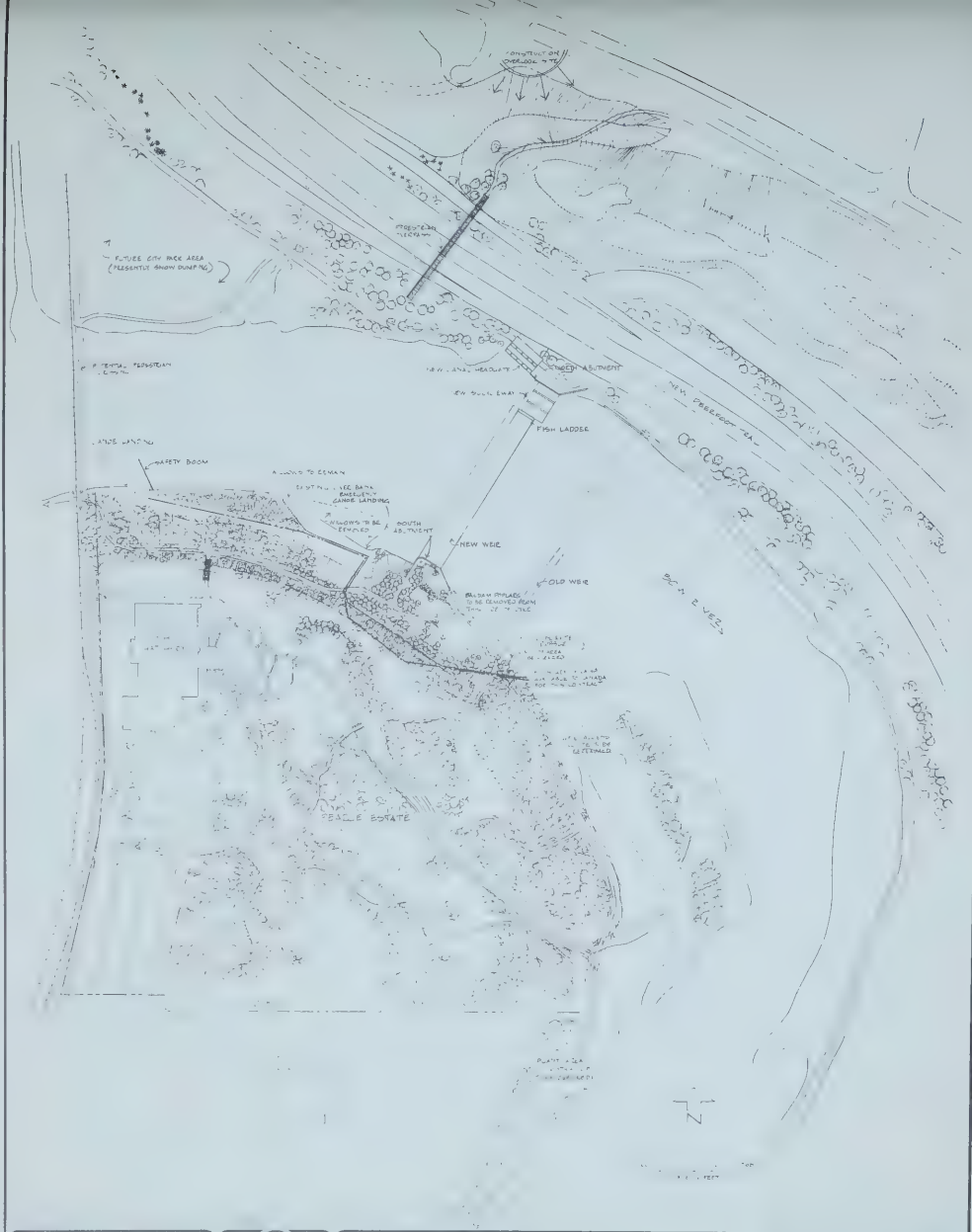
Concrete Finishes

Visual interest should be provided in the concrete textures to bring the massive structure down to a more comfortable human scale. Finishes chosen include a sandblasted finish for the areas of the abutment wall exposed to the public and for the kiosk. The concrete paving will have a variety of textures including sand blasted, exposed aggregate and broom finishes (Drawing #7).

Railings

A more comfortable and attractive wood and steel post rail on top of an extended segment of concrete wall has been selected to replace the standard pipe railing.

drawings



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"BOWER TRAIL"
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MASTER PLAN
001

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BOW RIVER AT DRY ARK

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2

PROJECT ACCESS

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3

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4

PRELIMINARY / DEVELOPMENT 1973/74 202

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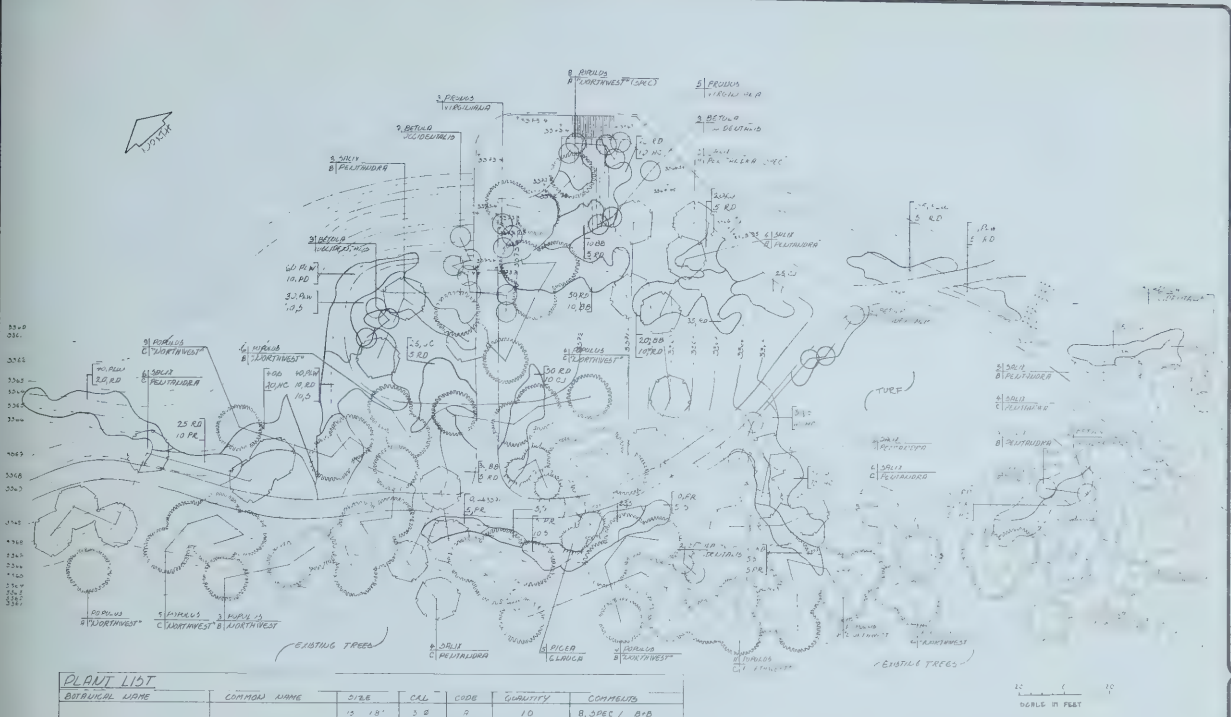

PLANT LIST

BOTANICAL NAME	COMMON NAME	SIZE	CAL	CODE	QUANTITY	COMMENTS
POPULUS "NORTHWEST"	NORTHWEST POPLAR	15'-18'	3" B	A	10	B, SPEC / B+B
		12'-15'	2"-2½"	B	25	B+B
		- - 2	2 - 2	C	36	B+B
PICEA GLAUCA	WHITE SPRUCE	8'-10'			5	B+B
SALIX PELTANDRA	LORAL LEAF WILLOW	- - 6	2½"-3"	A	6	- SPEC / B+B
		3 - 15	1½" 2½"	B	2	B+B
		- 2'	2½" - 3"	C	14	B+B
AMELANCHIER ALNIFOLIA	SASKATOON	3'-4'	FULL	S	225	PLANT 4'-5' O.C.
BETULA OCCIDENTALIS	WATER BIRCH	4-5'	FULL		5	
CORNUS STOLONIFERA	RED OSIER DOGWOOD	2'-3'	FULL	RT	215	PLANT 3' O.C.
JUNIPERUS COMMUNIS (DEP)	COMMON LOW JUNIPER	18"-24" (SPR)	FULL	CJ	30	PLANT 3' 4' O.C.
PRUNUS VIRGINIANA	CHOKE CHERRY	6-8'	FULL	B	8	
ROSA WOODSII	COMMON WILD ROSE	2'-3'	FULL	WR	45	PLANT 3' O.C.
SALIX AMYGDALOIDES	PEACH-LEAF WILLOW	3'-4'	FULL	PLW	290	PLANT 3'-4' O.C.
SHEPERDIA CANADENSIS	BUFFALO BERRY	3'-4'	FULL	BB	90	PLANT 4'-5' O.C.
VIBURNUM TRILOBUM	HIGHBUSH CRANBERRY	3'-4'	FULL	HC	60	PLANT 4'-5' O.C.

LEGEND

NOTE:
WHERE MORE THAN ONE VARIETY OF SHRUB IS TO BE PLANTED IN ANY ONE SHRUB BED, THEY ARE TO BE PLANTED IN IRREGULAR MIXED GROUPS, SO AS TO GIVE A NATURALLY GROWN APPEARANCE

BERMED CONTOURS

CONCRETE CURBING:
SHRUB BED AREAS

NOTE
PLANTING DETAIL ON SHEET # L3

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5
PLANTING PLAN
L2

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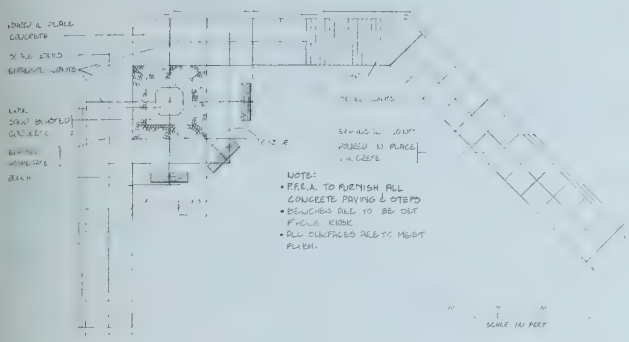
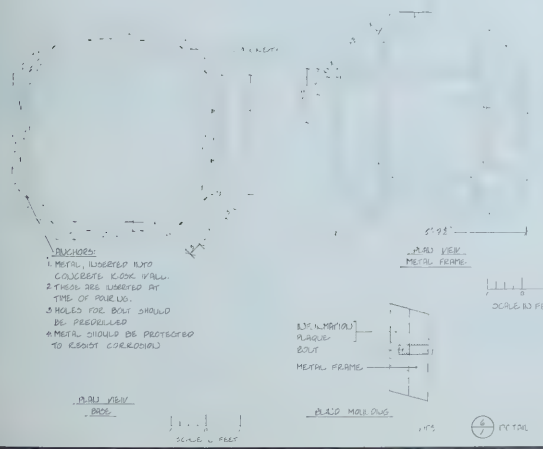
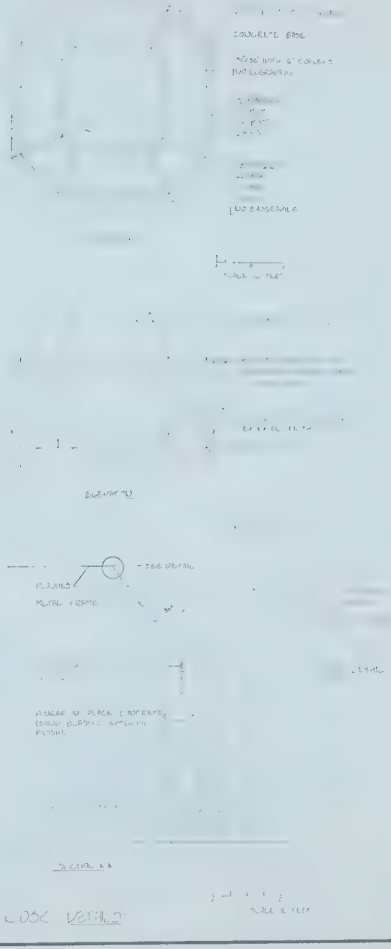

NOTE:
• P.F.R.A. TO FURNISH ALL CONCRETE PAVING & STEPS
• BENCHES ARE TO BE SET FACING KIOSK
• ALL SURFACES ARE TO MEET EVEN.
SCALE IN FEET

BENCH & KIOSK LAYOUT ON SOUTH ABUTMENT





KIOSK DETAILS

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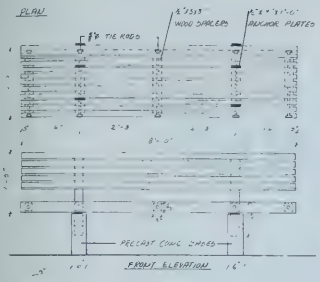
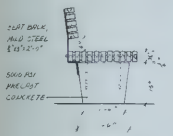




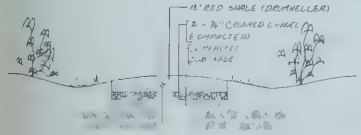
1. ⅝" ø TIE RODS (FRONT ENDS RECESSED & COVERED WITH WOODEN PLUGS
2. ALL WOOD TO BE SANDED & STAINED TO R.E. APPROVAL (SEE SPECIFICATIONS)
3. ALL EXPOSED METAL TO BE PAINTED FLAT BLACK.

SIDE ELEVATION

BENCH

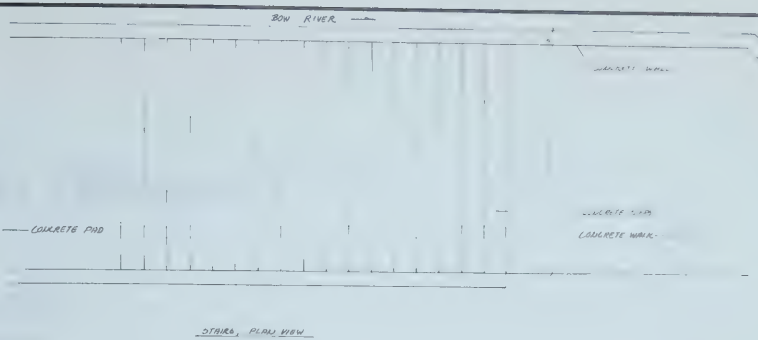
SCALE IN FEET

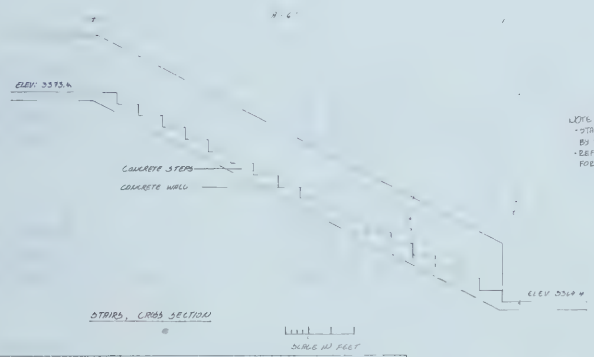
NOTE
- RED SHALE TO BE TENNIS COURT GRADE
2. PATHWAY TO BE MINIMALLY CROWNED TO FACILITATE ADEQUATE DRAINAGE.
- PATHWAY WIDTH SHALL VARY, SEE GRADING & LAYOUT SHEET



TYPICAL PATHWAY SYSTEM

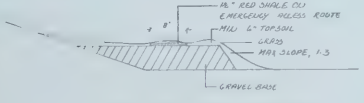
D15



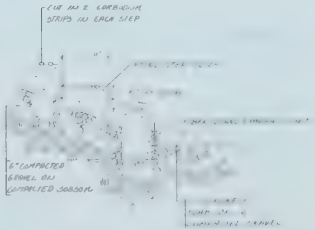


NOTE
- STAIRS ARE TO BE FURNISHED BY P.F.R.A.
- REFER TO P.F.R.A. DRAWINGS FOR STRUCTURAL DETAILS

NOTE:
SHRUBS PLANTED RANDOMLY ALONG THE EMERGENCY ACCESS ROUTE, SHALL NOT BE PLANTED CLOSER THAN 5' FROM PATH CENTRE



TYPICAL ACCESS ROAD & PATHWAY DETAIL



STAIR DETAIL

SCALE IN FEET

7

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Calgary

Dominion Bridge Group

Cost Estimate (1974 costs)

1. PLANT MATERIALS

South Abutment

Trees

Large trees spec:	8 @ $175	$ 1,400.00
Large Deciduous	26 @ $100	2,600.00
Medium Deciduous	42 @ $ 80	3,570.00
Small Deciduous	45 @ $ 75	3,375.00

Shrubs

Medium Deciduous	706 @ $ 10	$ 7,060.00
Small Deciduous	30 @ $ 5	150.00
Medium Coniferous Shrubs	30 @ $ 30	900.00

Emergency Access

Shrubs all 2-3' (5' O.C.)	1,000 @ $ 5	$ 5,000.00

Contractor's Plant Area

Medium trees	30 @ $ 85	$ 2,500.00

Canoe Landing

Shrubs	100 @ $ 5	$ 500.00

2. GRASS SEEDING

South Abutment	4,465 sq.yd. @ $.50/sq.yd.	$ 2,232.00
Emergency Access	2,600 square yards	1,300.00
Contractor's Plant Area	1,660 sq.yd. @ $.50/sq.yd.	840.00
Canoe Access	50 sq.yd. @ $.50/sq.yd.	25.00

3. TOP SOIL (assuming it is all imported)

South Abutment

Top soil for seed area	750 cu.yds.@ $3/cu.yd.	$ 2,250.00
Top soil for shrubs	500 cu.yds.@ $3/cu.yd.	1,500.00
Emergency Access	450 cu.yds.@ $3.00	$ 1,350.00
Contractor's Plant Area	110 cu.yds.@ $3.00	330.00
Canoe Landing	20 cu.yds.@ $3.00	60.00

4. MULCHING (1") (Inc: Emergency Access and Contractor's Plant Area)

Trees shrubs	allow	$ 1,000.00

5. SHALE WALKWAY

$31.50/cu. yd. installed

10 feet wide:	30 feet @ $2.00 per linear foot	$ 60.00
8 feet wide:	2,600 feet @ $2.60 per linear foot	4,160.00
6 feet wide:	2,300 feet @ $1.20 per linear foot	2,760.00
	TOTAL FOR SHALE WALKWAY:	$ 7,160.00

6. BENCHES

3 @ $200	$ 600.00

7. KIOSK

allow	$ 2,500.00

8. 60 DAY MAINTENANCE

$2,000/month	$ 4,000.00
TOTAL:	$52,202.00

ALBERTA

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